Stoller
Grand Junction Office established 1959

699-32-77 (A5131)
Log Data Report

Borehole Information:

Borehole: 699-32-77 (A5131)			**Site:** 216-S-10 Pond		
Coordinates (WA State Plane)		**GWL (ft)[1]:** 209.74		**GWL Date:** 5/13/2003	
North	**East**	**Drill Date**	**TOC[2] Elevation**	**Total Depth (ft)**	**Type**
436,916 ft	2,218,212 ft	May 1951	653.74 ft	290.7	Cable Tool

Casing Information:

Casing Type	Stickup (ft)	Outer Diameter (in.)	Inside Diameter (in.)	Thickness (in.)	Top (ft)	Bottom (ft)
Welded steel	2.2	8 5/8	8	0.3125	0	290.7

The logging engineer measured the casing stickup using a steel tape. A caliper was used to determine the outside casing diameter. The caliper and inside casing diameter were measured using a steel tape, and measurements were rounded to the nearest 1/16 in. Casing thickness was calculated. Casing bottom is as reported from the well completion summary report (Ledgerwood 1993).

Borehole Notes:

Borehole coordinates, elevation, and well construction information, as shown in the above tables, are from measurements by Stoller field personnel and Ledgerwood (1993). Zero reference is the top of the 8-in. casing. A reference point survey "X" is located on top of the casing stickup. A cement plug extends from 220 to 235 ft (Ledgerwood 1993).

Logging Equipment Information:

Logging System:	Gamma 1G		**Type:** SGLS (35%)
Calibration Date:	04/2003	**Calibration Reference:**	GJO-2003-438-TAR
		Logging Procedure:	MAC-HGLP 1.6.5, Rev. 0

Spectral Gamma Logging System (SGLS) Log Run Information:

Log Run	1	2/Repeat	3		
Date	5/12/03	5/13/03	5/13/03		
Logging Engineer	Kos	Kos	Kos		
Start Depth (ft)	219.0	69.0	47.0		
Finish Depth (ft)	46.0	47.0	2.0		
Count Time (sec)	100	100	100		
Live/Real	R	R	R		
Shield (Y/N)	N	N	N		
MSA Interval (ft)	1.0	1.0	1.0		
ft/min	N/A[3]	N/A	N/A		
Pre-Verification	AG009CAB	AG010CAB	AG010CAB		

Log Run	1	2/Repeat	3		
Start File	AG009000	AG010000	AG010022		
Finish File	AG009173	AG010022	AG010067		
Post-Verification	AG009CAA	AG010CAA	AG010CAA		
Depth Return Error (in.)	0	N/A	0		
Comments	No fine-gain adjustment.	No fine-gain adjustment.	No fine-gain adjustment.		

Logging Operation Notes:

Zero reference was top of the 8-in. casing. Logging was performed with a centralizer installed on the sonde. Pre- and post-survey verification measurements for the SGLS employed the Amersham KUT (^{40}K, ^{238}U, and ^{232}Th) verifier with serial number 118.

Analysis Notes:

Analyst:	Sobczyk	Date:	5/19/03	Reference:	GJO-HGLP 1.6.3, Rev. 0

SGLS pre-run and post-run verification spectra were collected at the beginning and end of each day. The verification spectra were all within the control limits. The peak counts per second (cps) at the 609-keV, 1461-keV, and 2615-keV photopeaks on the post-run verification spectra as compared to the pre-run verification spectra for each day were between 3 percent lower and 4 percent higher.

Log spectra for the SGLS were processed in batch mode using APTEC SUPERVISOR to identify individual energy peaks and determine count rates. Verification spectra were used to determine the energy and resolution calibration for processing the data using APTEC SUPERVISOR. Concentrations were calculated in EXCEL (source file: G1GMay03.xls), using parameters determined from analysis of recent calibration data. Zero reference was the top of the 8-in. casing. The casing configuration was assumed to be one string of 8-in. casing with a thickness of 0.3125 in. to total logging depth (219 ft). A water correction was applied to the SGLS data below 209.8 ft. Dead time corrections are required when dead time exceeds 10.5 percent. As the dead time did not exceed 10.5 percent, a dead time correction was not needed or applied.

Log Plot Notes:

Separate log plots are provided for gross gamma and dead time, naturally occurring radionuclides (^{40}K, ^{238}U, and ^{232}Th), and man-made radionuclides. Plots of the repeat logs versus the original logs are included. For each radionuclide, the energy value of the spectral peak used for quantification is indicated. Unless otherwise noted, all radionuclides are plotted in picocuries per gram (pCi/g). The open circles indicate the minimum detectable level (MDL) for each radionuclide. Error bars on each plot represent error associated with counting statistics only and do not include errors associated with the inverse efficiency function, dead time correction, or casing correction. These errors are discussed in the calibration report. A combination plot is also included to facilitate correlation. The ^{214}Bi peak at 609 keV was used to determine the naturally occurring ^{238}U concentrations on the combination plot rather than the ^{214}Bi peak at 1764 keV because it exhibited slightly higher net counts per second.

Results and Interpretations:

^{137}Cs was the only man-made radionuclide detected in this borehole. ^{137}Cs was detected at the ground surface (2 ft) with a concentration of 0.3 pCi/g. Using the routine processing parameters, ^{137}Cs was also detected at 12, 49, 183, 201, and 217 ft with concentrations near the MDL (0.2 pCi/g). After close examination of the spectra at depths of 12, 49, 183, 201, and 217 ft, it was determined there is no evidence

of a photopeak at 662 keV at these depths. These reported occurrences are probably the result of statistical fluctuation. In addition, the reported 662-keV photopeak at 49 ft on the original log run did not repeat.

Recognizable changes in the KUT logs occurred in this borehole. Changes of about 5 pCi/g in apparent ^{40}K concentrations occur at approximately 135, 180, and 182 ft. There is a 5-pCi/g decrease in ^{40}K concentrations at 135 ft. ^{40}K concentrations increase by approximately 5 pCi/g in the interval between 180 and 182 ft. ^{232}Th increases by approximately 0.4 pCi/g or more in the intervals between 115 and 135 ft and 180 and 182 ft. Between 115 and 135 ft, the fine-grained member of the Cold Creek Unit (formerly known as the Early Palouse Soil) is shown by an increase in total gamma (50 cps) and ^{232}Th (0.4 pCi/g).

The plots of the repeat logs demonstrate reasonable repeatability of the SGLS data for the natural radionuclides (609, 1461, 1764, and 2614 keV).

References:

Ledgerwood, R.K., 1993. *Summaries of Well Construction Data and Field Observations for Existing 200-West Resource Protection Wells*, WHC-SD-ER-TI-005, Rev. 0, Westinghouse Hanford Company, Richland, Washington.

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[1] GWL – groundwater level
[2] TOC – top of casing
[3] N/A – not applicable

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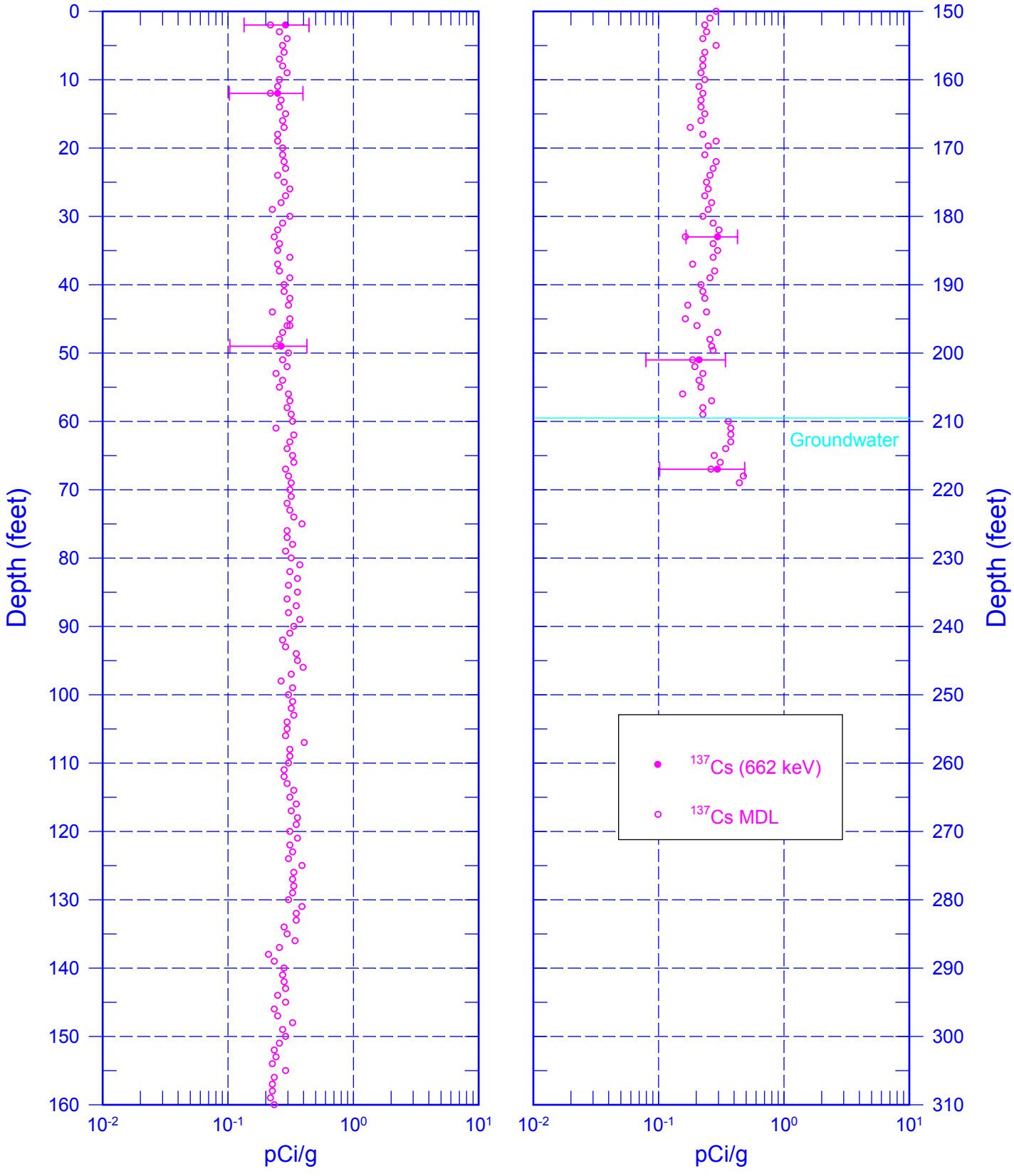
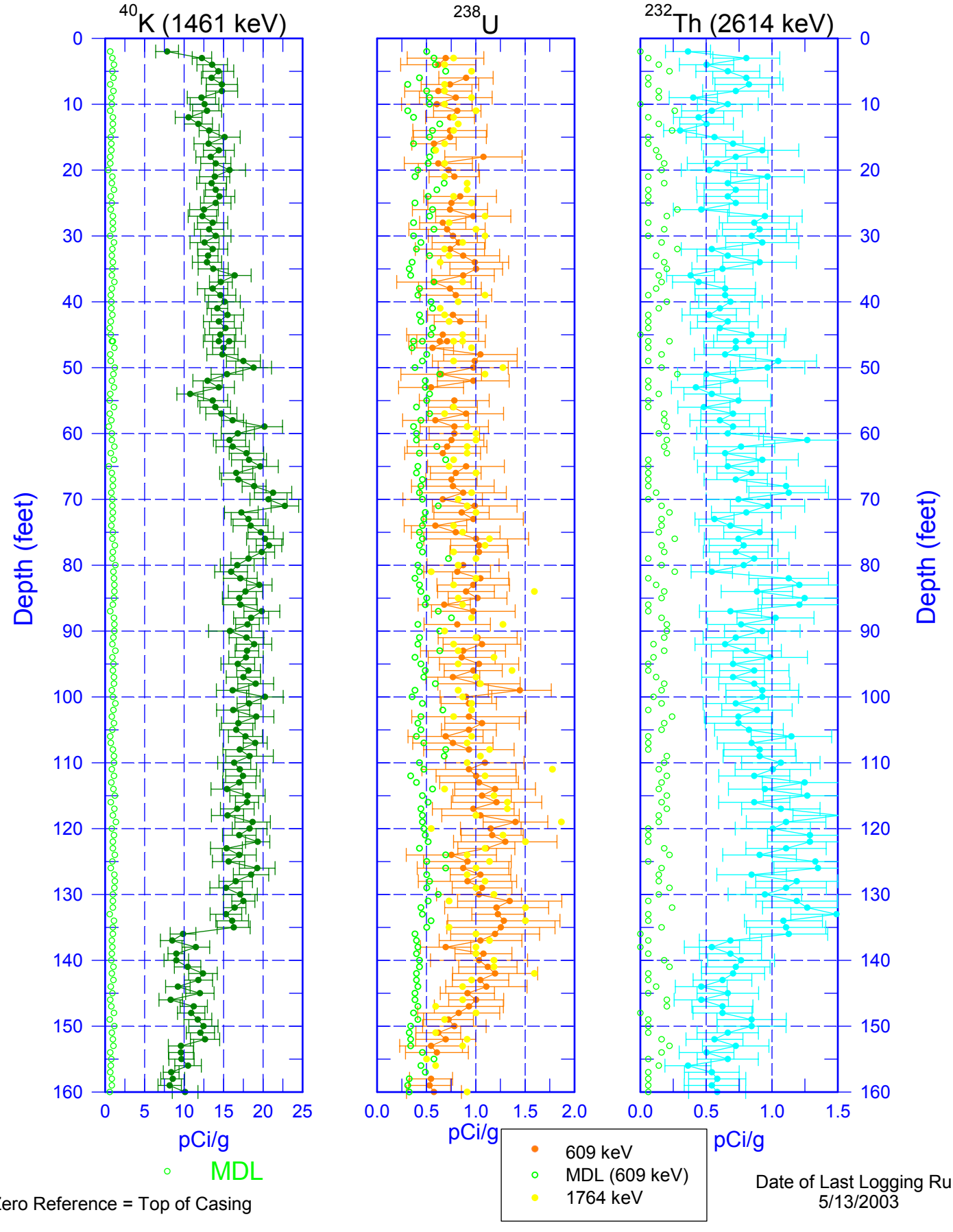
Man-Made Radionuclides



Zero Reference = Top of Casing

Date of Last Logging Run
5/13/2003

699-32-77 (A5131)
Natural Gamma Logs



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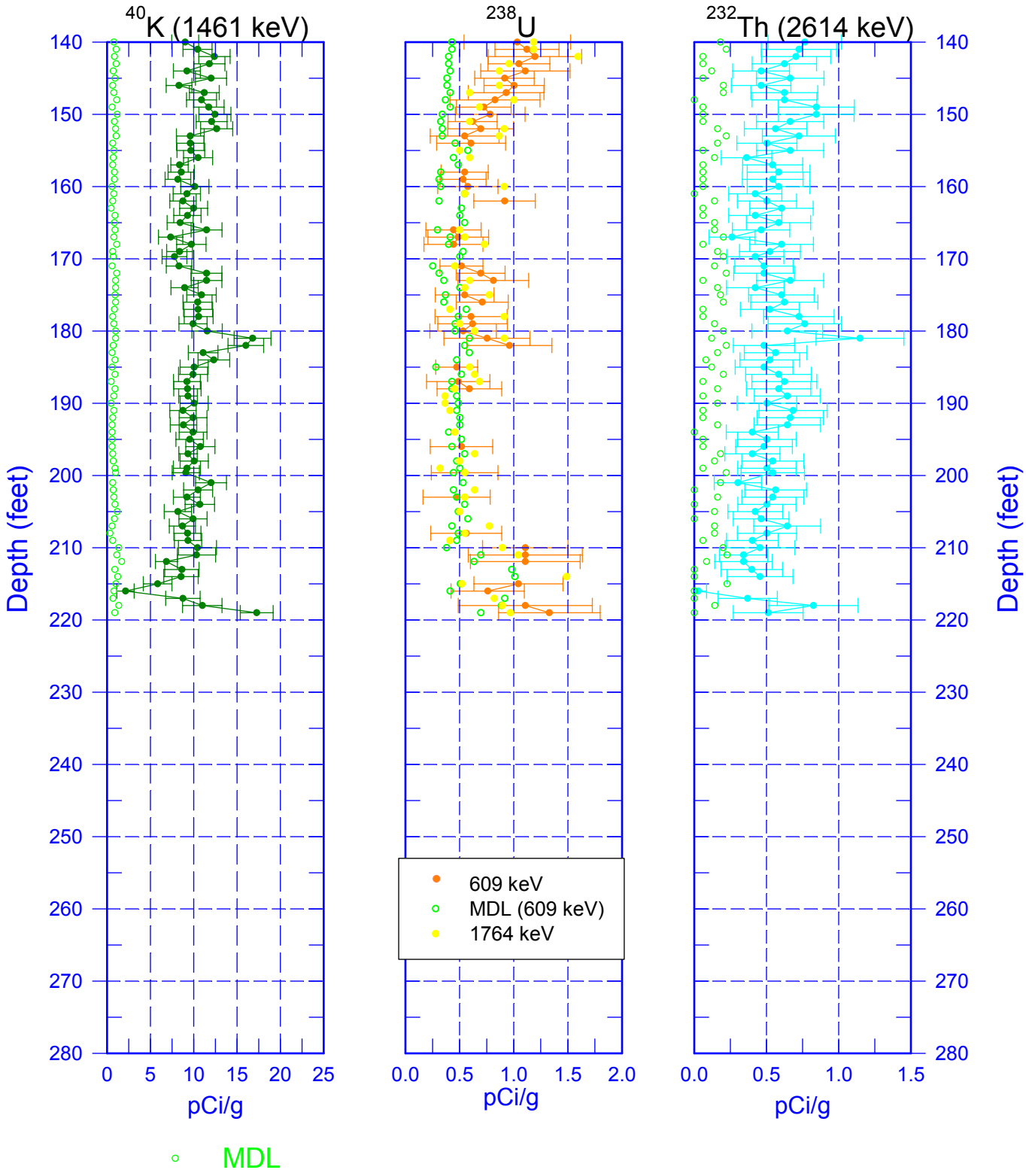
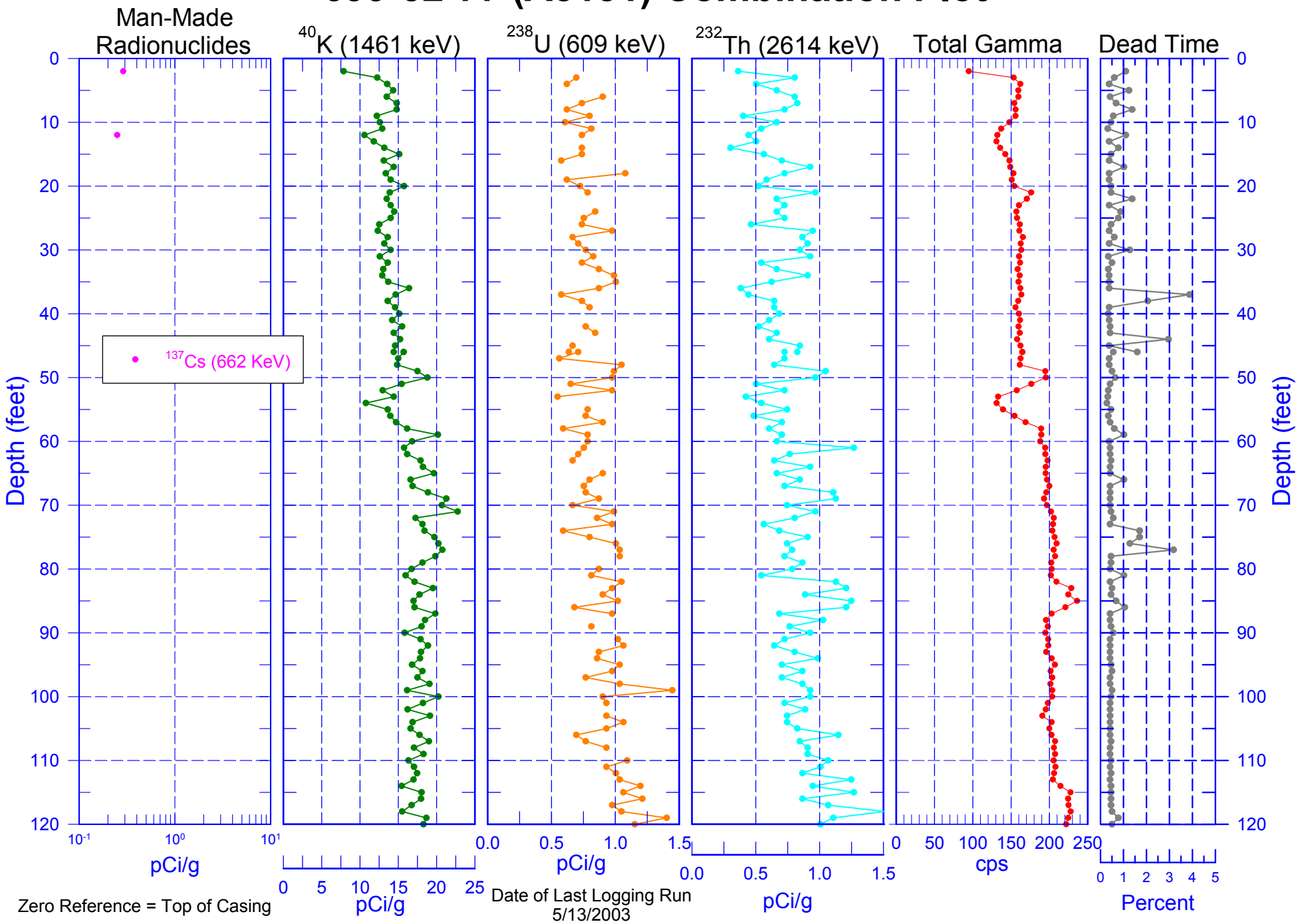
699-32-77 (A5131)
Natural Gamma Logs



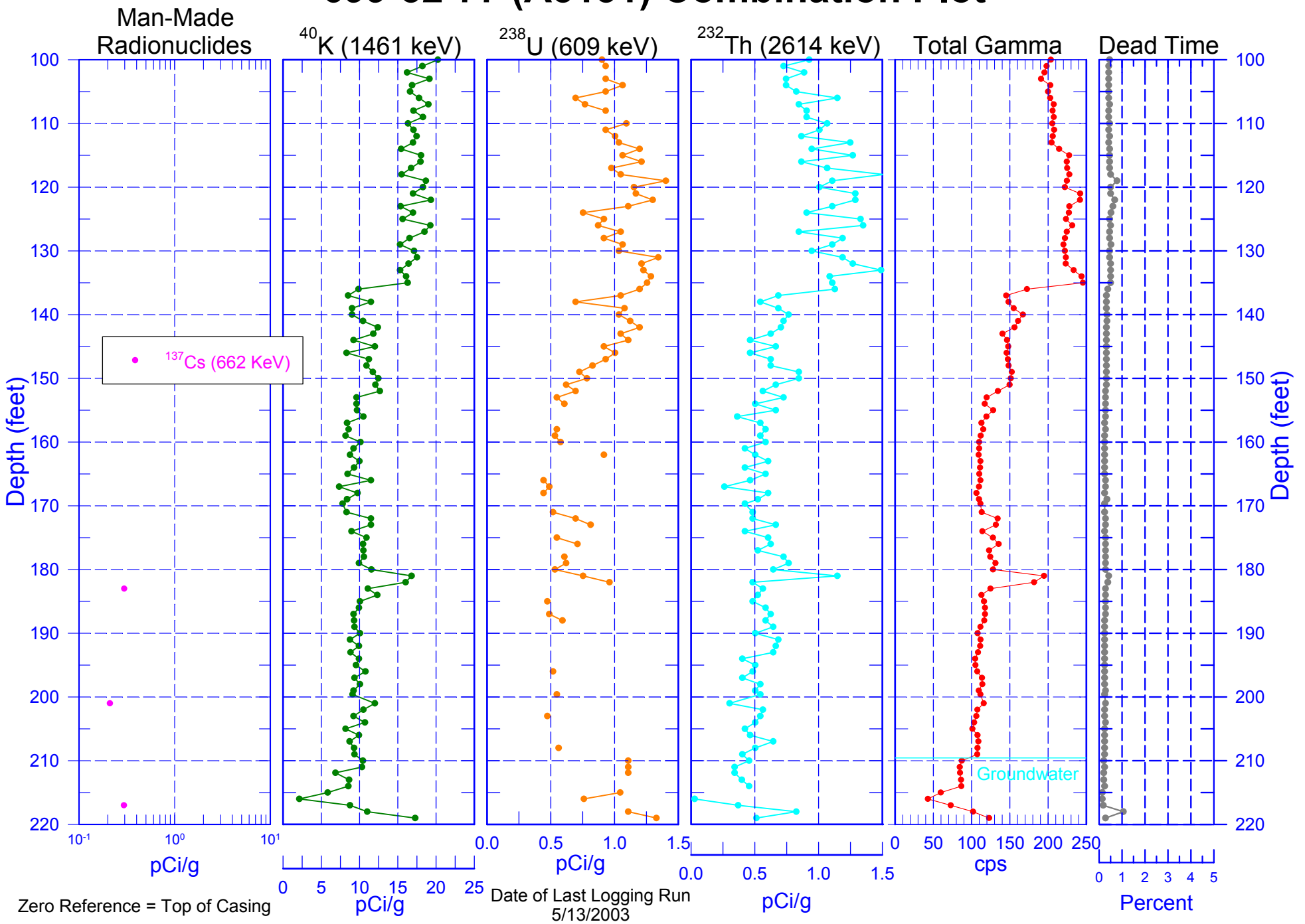
Zero Reference = Top of Casing

Date of Last Logging Run
5/13/2003

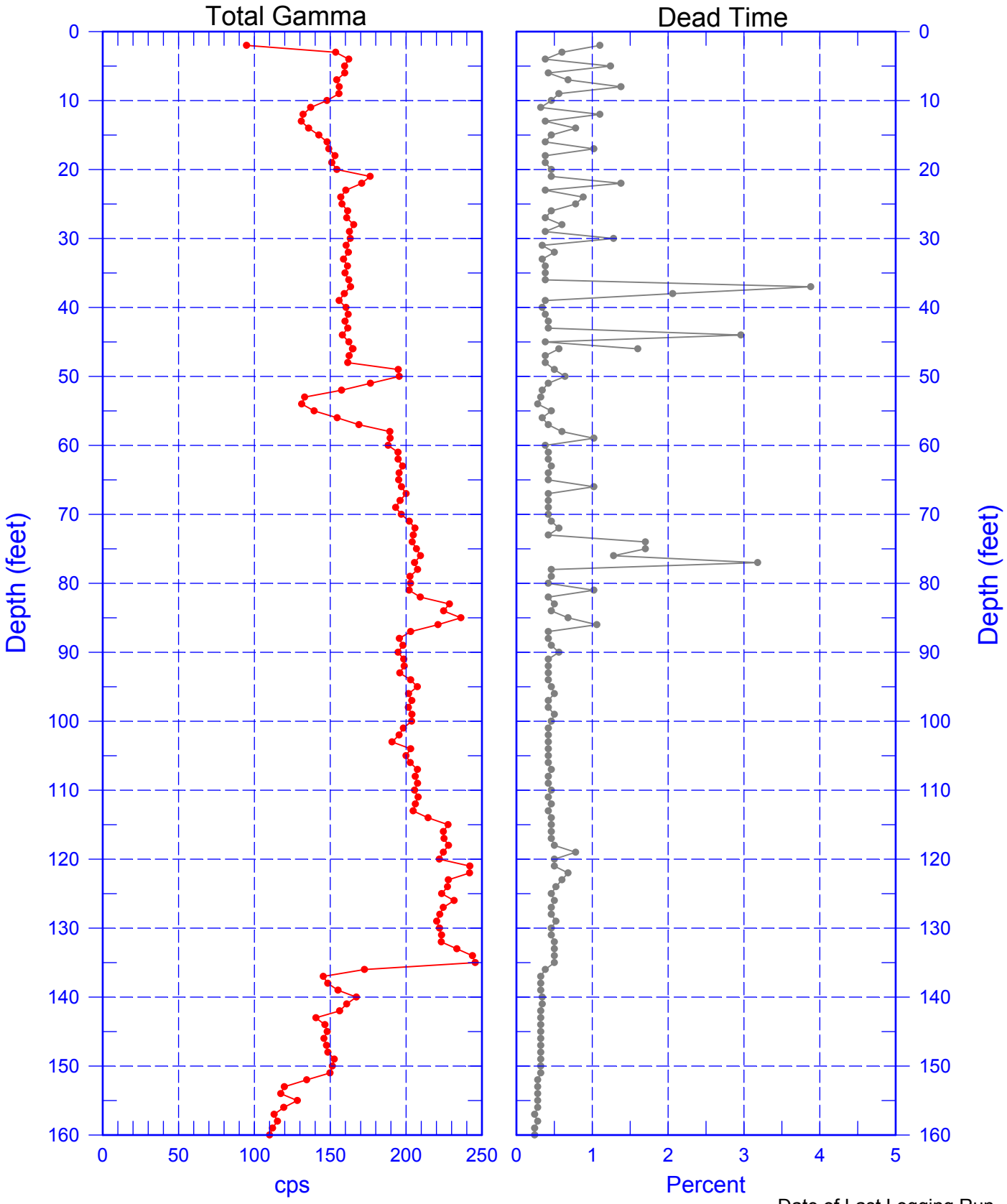
699-32-77 (A5131) Combination Plot



699-32-77 (A5131) Combination Plot



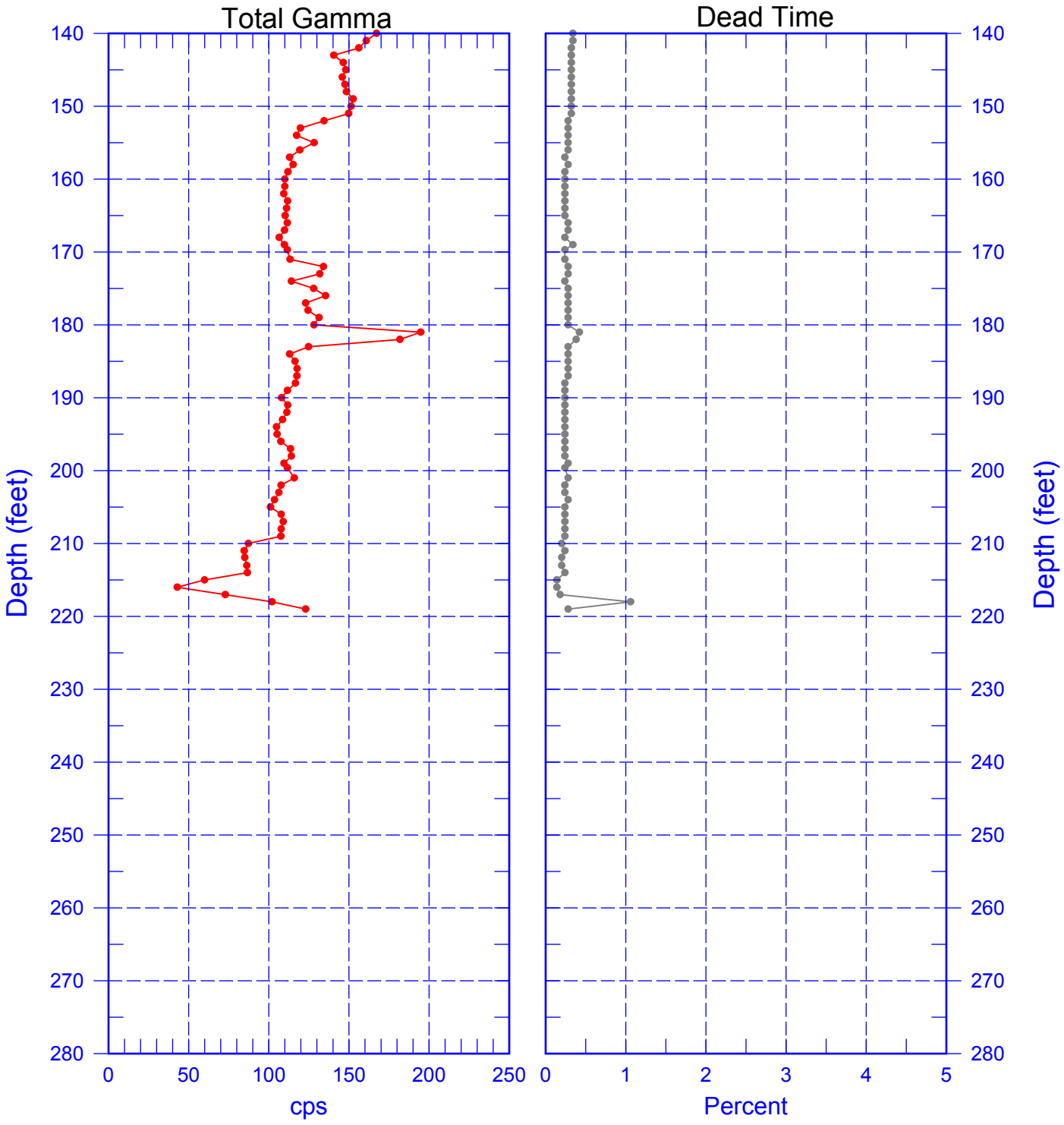
699-32-77 (A5131)
Total Gamma & Dead Time



Date of Last Logging Run
5/13/2003

Zero Reference = Top of Casing

699-32-77 (A5131)
Total Gamma & Dead Time



Date of Last Logging Run
5/13/2003

Zero Reference = Top of Casing

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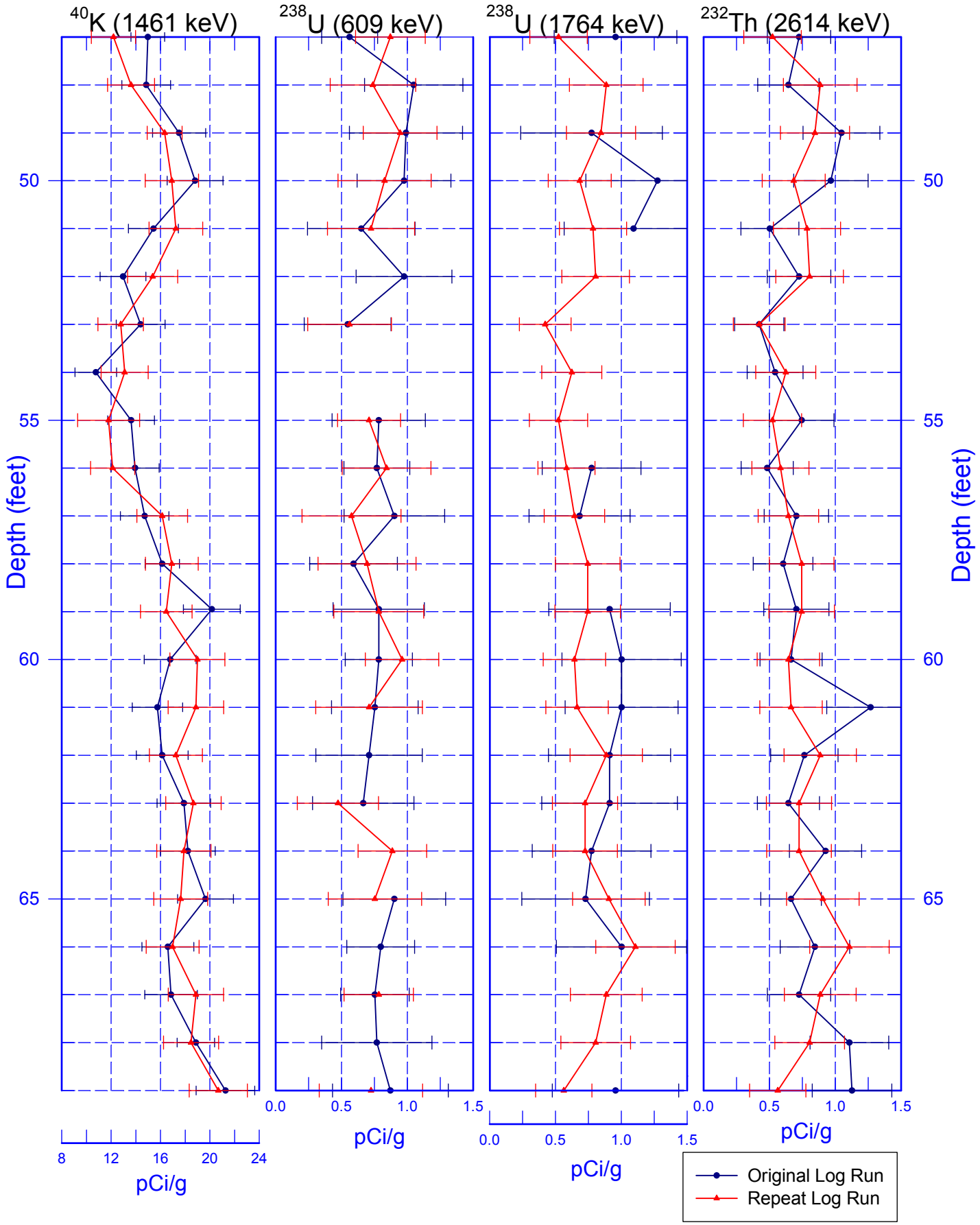
Rerun of Natural Gamma Logs (69.0 to 47.0 ft)



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Rerun of Man-Made Radionuclides (69.0 to 47.0 ft)